Title (en)

PROCESS FOR OBTAINING DIAMOND LAYERS BY GASEOUS-PHASE SYNTHESIS

Title (de)

VERFAHREN ZUR HERSTELLUNG VON DIAMANTSCHICHTEN MITTELS GASPHASENSYNTHESE

Title (fr)

PROCEDE DE PRODUCTION DE PELLICULES DE DIAMANT SELON LA METHODE DE SYNTHESE EN PHASE VAPEUR

Publication

EP 0989211 B1 20040811 (EN)

Application

EP 97921011 A 19970416

Priority

RU 9700115 W 19970416

Abstract (en)

[origin: EP0989211A1] The disclosed process for obtaining diamond layers by gaseous-phase synthesis comprises generating a glow discharge of a direct current in a discharge gap between the cathode and the anode in a hydrogen flow. The substrate is heated to a temperature of between 700 and 900 DEG C, and the diamond layer is deposited on both a dielectric and a conducting substrate at a discharge current density of 0.3-2 A/cm<2>. The deposition is carried out in a mixture of hydrogen and carbon-containing gas, with a carbon-containing gas concentration of 3-10 % in a gas flow. The graphite phase excess of the discharge in the hydrogen flow is then removed during a period of 5-10 minutes. The carbon containing gas may consist of methane at a 3-8 % concentration, and the substrate may be placed on a grounded or insulated holder out of the discharge gap at a distance of 0.1-5mm from the anode. The anode is made in the shape of an array of molybdenum wire with a diameter of 0.1-1mm and a pitch of 1-3mm. During the deposition process of the diamond layer on the conducting substrate, said substrate may be disposed on the anode. In the case of a deposition process of a diamond layer on a silicon substrate, the natural silicon oxide is first removed from the substrate during a period of 10-20 minutes in the hydrogen flow at a current of 0.3-2 A/cm<2>. A layer of silicon carbide is created on the substrate by feeding methane at 7-12 % into the gas flow during a period of 10-20 minutes. The diamond layers obtained using this process have a nanocrystalline structure, which produces layers with an emission threshold of up to 3-4V/ mu m and a current density of over 100mA/cm<2>. These characteristics enable the diamond layers to be used in the production of flat displays, as well as in electron microscopes, microwave electronics and a number of other applications.

IPC 1-7

C30B 25/10; C23C 16/26

IPC 8 full level

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CPC (source: EP)

C23C 16/272 (2013.01); **C30B 25/02** (2013.01); **C30B 29/04** (2013.01)

Citation (examination)

POLUSHKIN V.M. ET AL: "Diamond film deposition by downstream d.c. glow discharge plasma chemical vapour deposition", DIAMOND AND RELATED MATERIALS, vol. 3, 1994, pages 531 - 533

Cited by

EP2851457A1; DE102004012044A1; US10066317B2

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EP 0989211 A1 20000329; **EP 0989211 A4 20000705**; **EP 0989211 B1 20040811**; AU 2716797 A 19981111; DE 69730246 D1 20040916; DE 69730246 T2 20050804; JP 2002501469 A 20020115; WO 9846812 A1 19981022

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